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(54) Title: ORTHOGONALLY AMBIGUOUS CARPET TILE

(57) Abstract: Carpet tiles having patterns and color schemes that obviate the need to orient the tiles relative to each other. The tiles exhibit orthogonal ambiguity, meaning that they may be laid in any side-by-side orientation with respect to adjacent tiles without looking out of place to the ordinary viewer and thereby still achieving an appearance of continuity like broadloom carpet. Each tile has patterns of shapes having some straight sides and that appear to be randomly positioned but oriented with some straight sides parallel to carpet tile sides. The shapes are formed from a color or combination of colors so that adjacent shapes on each tile have at least one color in common. Furthermore, each tile has at least one color in common with every other tile, so that when the tiles are laid, the colors on adjacent tiles coordinate. All of the colors have similar intensities so that no one color will significantly stand out from the other colors. Moreover, because the pattern on each tile appears random, placement of the tiles on the floor in any side-by-side orientation simply creates a larger, apparently random pattern, rendering it impossible for any tile to look out of place.

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Orthogonally Ambiguous Carpet Tile

Field of the Invention

This invention relates generally to carpet tiles and a method of designing carpet tiles

5   . having patterns and color schemes that allow for placement of the carpet tiles in any

orientation with respect to adjacent carpet tiles while still achieving the appearance of

broadloom carpet.

Background of the Invention

Traditionally, proper placement of carpet tiles has been necessary to give the

10   appearance of seamless broadloom carpet or at least the appearance of a carpet tile

installation in which tiles are not out of place or misplaced. Conventional carpet tiles,

particularly including tufted, fusion bonded, or woven face carpet tiles, normally have a

"direction" as a result of (1) the pattern on the tiles and/or (2) the manufacturing process.

After the carpet web is cut into the tiles, the tiles must be oriented on the floor so that

15   their pattern aligns with the patterns on adjacent tiles or with the appearance of adjacent tiles.

Most carpet tiles are square. If a first carpet tile is placed on the floor, a second tile may be

placed in four different positions relative to each side of the first tile by rotating the second

tile in 90 degree increments relative to the first carpet tile and by placing the second tile

adjacent to each of the four sides of the first tile. In only one of the second tile's four

20   rotational positions is the second tile oriented in the same "direction" as the first tile, so that

both tiles are in the same rotational orientation as they were relative to each other in the

carpet web from which they were cut or as they came off of the carpet producing machine.

Moreover, some patterns used on carpet tiles require that the second tile be placed only

adjacent to a particular side or sides of the first tile, rather than adjacent to any of the four

25   sides of the first tile.

Furthermore, because of the manufacturing process, even solid color tiles without any

pattern usually have a nap orientation or "direction." Additionally, minor variations in color

require that carpet tiles in a particular installation all use yarn dyed in the same dye lot to

avoid visually discernable differences between adjacent carpet tiles resulting from variations

30   in dying.

Therefore, not only must the patterns of adjacent tiles be aligned, adjacent tiles must

be placed so that the nap is oriented in the same direction, and it is frequently necessary to

insure that adjacent tiles, and sometimes all tiles in a particular installation, were dyed or

have fiber dyed at the same time. If one carpet tile in an installation is oriented improperly with respect to adjacent carpet tiles, it is usually readily apparent that the tile has been misplaced, thereby destroying the appearance of continuity of pattern, nap, and color of the entire carpet tile installation. The carpet installer, therefore, must spend valuable time during

5   installation ensuring proper orientation of the tiles.

Summary of the Invention

This invention addresses the above-described problems by providing carpet tiles and a method of making carpet tiles having patterns and color schemes that obviate the need to orient the tiles (with respect to pattern or nap) relative to each other and that generally

10   eliminate the need to match tiles as to dye lot. Instead, the tiles exhibit orthogonal ambiguity, meaning that tiles may be laid in any side-by-side orientation with respect to adjacent tiles without looking out of place to the ordinary viewer and thereby still achieving an appearance of continuity across the entire installation as if the tiles were part of a broadloom web.

"Orthogonally ambiguous" tiles must be positioned in one of sixteen positions relative

15   to each other. Such positioning is achieved by rotating adjacent tiles in ninety degree increments relative to each other. A "rotational position indeterminate" carpet web pattern can be imaged in which any tile can be cut from the web in any rotational position relative to any other tile cut from the web, including a rotational position displayed by other than ninety degree increments (e.g. forty-five degrees). However, cutting tiles from a web at such

20   orientations would generally produce substantial waste and be impractical.

The orthogonally ambiguous tiles of this invention are produced by first producing a carpet web having a pattern exhibiting the characteristics described herein and then cutting the web into tiles in the conventional ways that tiles are typically cut from a carpet web produced for that purpose. The web has a pattern of shapes having at least some straight

25   edges that will parallel the tile edges but that appear to be randomly oriented and positioned within the pattern. The shapes are formed from a color or combination of colors so that adjacent shapes on each tile have at least one color in common. Furthermore, each tile always has at least one color in common with every other tile, so that when the tiles are laid, the colors on adjacent tiles coordinate. All of the colors typically should have similar

30   intensities so that no one color significantly stands out from the other colors.

Because the pattern on each tile appears random, placement of the tiles on the floor in any orientation simply creates a larger, apparently random pattern, rendering it impossible for any tile to look out of place. Such randomness masks the visual effects of having adjacent

carpet tiles with misaligned or differently-oriented naps and also masks slight color variations resulting from dye lot differences. The presence, within the pattern, of shapes with edges parallel to the edges of the tile insures that, if the shapes are partitioned when the web is cut into tiles, the partitioned shapes will not appear out of place, since the shapes of the pattern

5   already include elements, having straight edges parallel to at least one of the tile edges, similar to the partitioned shapes, which have a straight edge defined by the straight edge of a panel. Given the apparent randomness of the pattern and color scheme, worn or soiled tiles in a particular installation may easily be replaced with an unused tile without the new tile looking as dramatically different from the remaining tiles as often results with tiles with

10   conventional patterns.

It is thus an object of this invention to provide carpet tiles that may be laid in any orientation with respect to each other and still achieve the appearance of a continuous piece of broadloom carpet.

Brief Description of the Drawings

15   FIG. 1 is a top plan view of a carpet tile web produced in accordance with one embodiment of this invention.

FIG. 2 is a top plan view of two carpet tiles produced in accordance with this invention positioned in a first orientation relative to each other.

FIG. 3 is a top plan view of the two carpet tiles illustrated in FIG. 2 with one of the

20   tiles rotated ninety degrees from the orientation illustrated in FIG. 2.

Detailed Description of the Drawings

FIG. 1 illustrates a carpet web 22 having a pattern consistent with this invention. Longitudinal partition lines 24-26 and horizontal partition lines 27-30 show how the web 22 may be partitioned into twenty individual carpet tiles 1-20. A number of factors contribute to

25   the orthogonal ambiguity of each carpet tile, including pattern shapes and arrangement and shape colors.

The pattern produced on web 22 produces tiles with shapes that appear randomly positioned on the tile. Only shapes having certain characteristics are usable. First, at least some of the shapes must have straight sides parallel to the "machine" and "cross-machine"

30   direction of the web 22, and therefore parallel to the tile edges. For instance, shape 32 in FIG. 1 has a straight side 34 parallel to longitudinal partition line 24 and therefore parallel to the edge of tile 1 that will be defined by longitudinal partition line 24. Similarly, shape 32 has a straight side 36 parallel to horizontal partition line 27, and it, too, will parallel the edge

of tile 1 that will be defined by horizontal partition line 27. Partition line 24 will pass through and partition shape 32, thereby resulting in a portion of shape 32 ending up on each of tile 1 and 2. The straight edge of shape 32 that will appear on each of tile 1 and 2 will not appear to be out of place.

5   Size of the shapes within the pattern is also important, as is lateral position of the shapes within the web. The shapes must generally be small enough so that several shapes will end up positioned within each tile. Otherwise, the fraction or fractions of larger shapes falling on a particular carpet tile would potentially look odd. Shapes should be positioned laterally within the web so that longitudinal partition lines 24, 25, and 26 do not partition a

10   shape so that an oddly narrow portion falls on one of the tiles.

Each tile preferably has the same background color. At least one color, different from the background color, is used to form the shapes on the tile. Regardless of how many colors are used, all of the colors should have similar intensities so that no one color significantly stands out from the other colors. Note that multiple shapes may be, and preferably should be,

15   formed on each tile. It is important, however, that each shape have at least one color in common with adjacent shapes on the tile. Use of multiple shapes and colors contributes to the apparent random quality of the pattern, thereby making an installation of such tiles appear to be continuous without regard to the orthogonal orientation of the tiles within the installation.

20   While the adjacent shapes of each tile have at least one color in common, additionally, each tile preferably has at least one color in common (in addition to the background color) with every other tile, so that when the tiles are laid, the colors on adjacent tiles will coordinate.

Because the pattern on each tile appears random, placement of the tiles on the floor in

25   any orientation simply creates a larger, apparently random pattern, rendering it impossible for any tile to look out of place. Such apparent randomness obviates the need to align the nap or "direction" of adjacent tiles, as misaligned naps further enhance the random appearance of the carpeting. Such randomness also masks color variation resulting from dye lot differences.

In summary, the "rules" for creating a pattern in accordance with this invention are:

30   1. Utilization of a background color for the entire web from which tiles will be cut.

2. Utilization of a pattern of shapes on the web formed by colors of approximately the same intensity as the background color and each other.

3. Utilization of shapes small enough for several to appear on each tile.

4. Utilization of shapes having straight edges parallel to the tile edges.

5. Utilization of a pattern causing each tile cut from the web to have at least 1 color in common with each other tile.

5   The carpet web 22 shown in FIG. 1 practices these rules and may be formed by a conventional carpet tufting machine. For example, a tufting machine having two rows of needles may be used. One row of needles may be threaded up with a single background color that is present across the entire carpet web 22. The second row of needles may be threaded with yarns of other colors as described below. The pattern of shapes is created on the carpet web by controlling the height of the yarn. The farther the yarn is pushed through the primary

10   backing, the greater its height in the finished carpet tile and the more predominant the color of the yarn is to the ordinary observer. In the pattern shown in FIG. 1, the background yarn A tufts have a uniform height across their entire pattern, so that at least some background yarn A is visible in all areas of the pattern, and some areas show only background yarn A.

       For ease of manufacture, in the embodiment shown in FIG. 1 the color scheme of the

15   carpet web 22 is symmetrical about the longitudinal partition line (and also longitudinal axis) 25 of the carpet web 22. This means that the two side-by-side tiles 1 and 2 on one side of a production line can be boxed together, while the two side-by-side tiles 3 and 4 on the other side of the production line can be boxed together, and all boxes will have the same proportions of tiles having a particular color combination. This symmetry would not be

20   necessary if tiles from the entire line were used to fill all of the boxes or other packages of tiles produced together.

       The background color A is tufted over the entirety of the carpet web 22. The patterns of the outer portions BC of the web 22 are further formed from alternating colors B and C. Directly adjacent the outer portions BC, the patterns of middle portions CD are further

25   formed from alternating colors C and D. Finally, the patterns of center portion DE are further formed from alternating colors D and E.

       While the carpet web 22 may be divided into any number of tiles, the carpet web 22 of FIG. 1 is divided into tiles 1-20 so that at least part of each tile has the color schemes of at least two of the portions – BC, CD, and DE. For example, outer portion BC and middle

30   portion CD make up tile 1. In this embodiment, the shapes of tile 1 are made from: (1) the background color A only; (2) the background color A and color B only; (3) the background color A and color C only; (4) the background color A, color B, and color C; (5) the

background color A and color D only; and (6) the background color A, color C, and color D. In this way, adjacent shapes of each tile have at least one common color.

Moreover, adjacent tiles have at least one color in common (in addition to the background color). For example, tile 1 and tile 2 have both color C and color D in common.

5 When the tiles are placed on the floor, therefore, the colors on these adjacent tiles blend to facilitate the appearance of continuity.

The foregoing is provided for the purpose of illustrating, explaining and describing embodiments of the present invention. Further modifications and adaptations to these embodiments will be apparent to those skilled in the art and may be made without departing

10 from the spirit of the invention or the scope of the following claims. For instance, different shapes and sizes of shapes than those illustrated can be used. Similarly, a wide variety of color combinations are possible. Furthermore, while the embodiment described above is tufted, the face fabric could also be woven on a conventional or computer controlled Jacquard or other loom, and the face fabric could be fusion bonded or formed in other manners. This

15 invention could also be used for modular flooring or surface covering materials other than carpet tile, such as vinyl tile.

What is claimed is:

1   1.   An orthogonally ambiguous carpet tile.

1   2.   The orthogonally ambiguous carpet tile of claim 1, wherein the tile has a tufted face.

1   3.   The orthogonally ambiguous carpet tile of claim 1, wherein the tile has a woven face.

1   4.   The orthogonally ambiguous carpet tile of claim 1, wherein the tile has a fusion
2   bonded face.

1   5.   An orthogonally ambiguous carpet tile having a pattern comprising a background
2   color and a first color different from the background color.

1   6.   The carpet tile of claim 5, wherein the background color and the first color have
2   similar intensities.

1   7.   The carpet tile of claim 5, wherein the pattern comprises shapes, at least one of which
2   shapes is formed by at least one straight line.

1   8.   The carpet tile of claim 7, wherein adjacent shapes comprise at least one common
2   color.

1   9.   The carpet tile of claim 7, wherein the at least one straight line is oriented parallel to
2   an edge of the carpet tile.

1   10.   The carpet tile of claim 7, wherein at least one shape comprises only the background
2   color.

1   11.   The carpet tile of claim 7, wherein a least one shape comprises the background color
2   and the first color.

1   12.   The carpet tile of claim 7, wherein the pattern further comprises a second color

2   different from the background color and the first color.

1   13.   The carpet tile of claim 12, wherein the background color, the first color, and the

2   second color have similar intensities.

1   14.   The carpet tile of claim 12, wherein at least one shape comprises only the background

2   color and the second color.

1   15.   The carpet tile of claim 12, wherein at least one shape comprises the background

2   color, the first color, and the second color.

1   16.   The carpet tile of claim 12, wherein the pattern further comprises a third color

2   different from the background color, the first color, and the second color.

1   17.   The carpet tile of claim 16, wherein the background color, the first color, the second

2   color, and the third color have similar intensities.

1   18.   The carpet tile of claim 16, wherein at least one shape comprises only the background

2   color and the third color.

1   19.   The carpet tile of claim 16, wherein at least one shape comprises only the background

2   color, the second color, and the third color.

1   20.   An orthogonally ambiguous carpet tile comprising a pattern of shapes, at least one of

2   which shapes is formed by a straight line oriented parallel to an edge of the carpet tile,

3   wherein the shapes are further formed from at least one of a plurality of colors comprising at

4   least a background color, a first color, and a second color, wherein at least one of the shapes

5   is formed from the background color only, at least one of the shapes is formed from the

6   background color and the first color only, at least one of the shapes is formed from the

7   background color and the second color only, and at least one of the shapes is formed from the

8   background color, the first color, and the second color, wherein the background color, the

9   first color, and the second color have similar intensities and wherein adjacent shapes

10   comprise at least one common color.

1   21.   Floorcovering comprising at least two orthogonally ambiguous carpet tiles positioned

2   side-by-side.

1   22.   Floorcovering comprising at least two orthogonally ambiguous carpet tiles positioned

2   side-by-side wherein each tile comprises a pattern formed by a background color and at least

3   two colors different from the background color, wherein the background color and at least

4   one of the at least two colors different from the background color are the same for the at least

5   two orthogonally ambiguous carpet tiles.

1   23.   The carpeting of claim 22, wherein the pattern on each of the at least two orthogonally

2   ambiguous carpet tiles comprises shapes, at least one shape on each of the at least two

3   orthogonally ambiguous carpet tiles having a straight side.

1   24.   The carpeting of claim 23, wherein adjacent shapes on each of the at least two

2   orthogonally ambiguous carpet tiles comprise at least one common color.

1   25.   A method for designing a pattern for a carpet web usable to produce orthogonally

2   ambiguous carpet tiles, comprising:

3   a.   selecting a background color for the carpet web;

4   b.   using a plurality of colors, including the background color, to form shapes on

5   the carpet web; and

6   c.   designing and positioning the shapes on the carpet web so that at least one

7   shape has at least one straight side parallel to an edge of the carpet web and adjacent shapes

8   have at least one common color.

1   26.   A method for designing a pattern usable to produce orthogonally ambiguous square

2   modules, comprising:

3   a.   selecting a background color for the pattern;

4   b.   using a plurality of colors, including the background color, to form shapes in

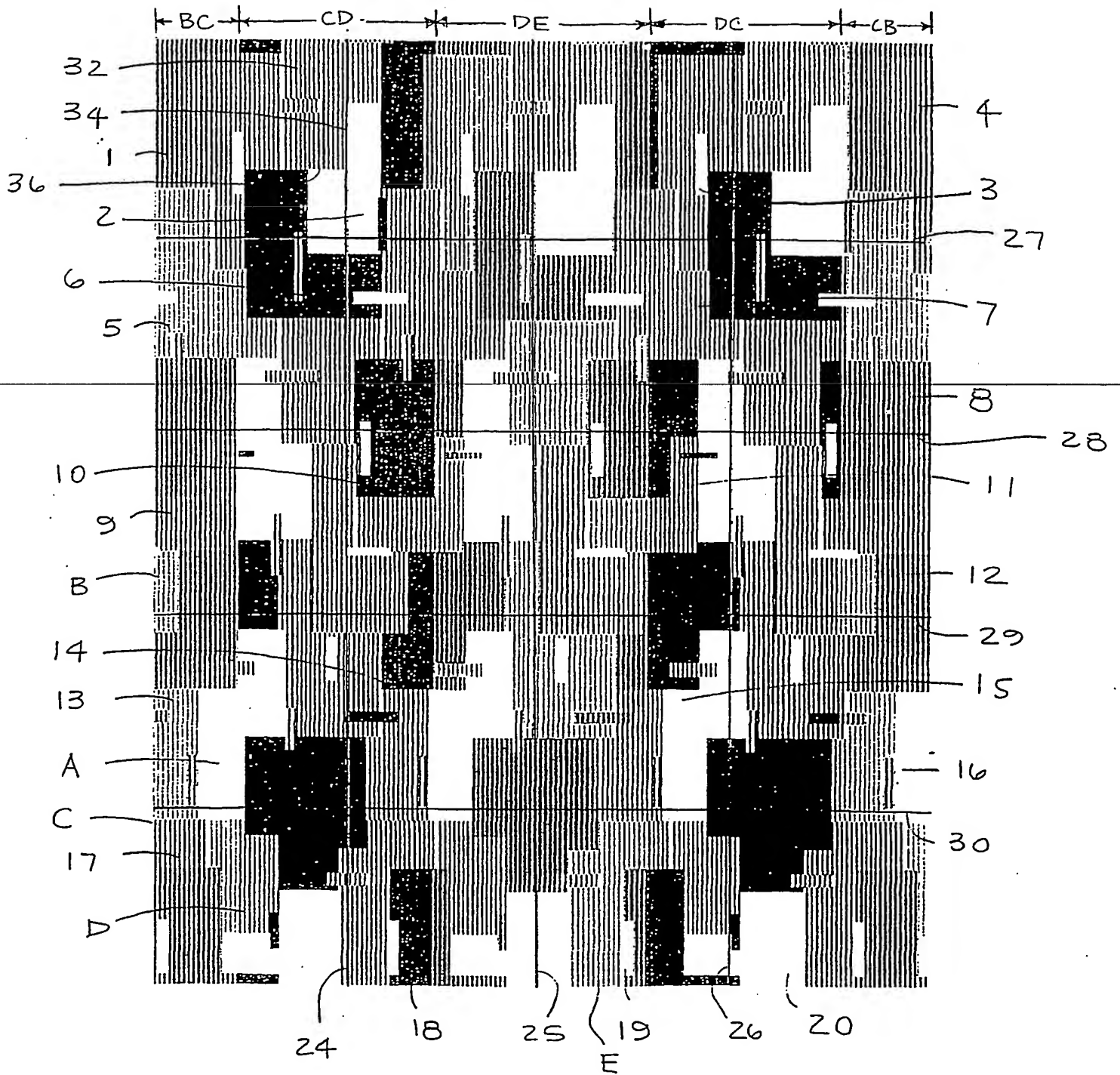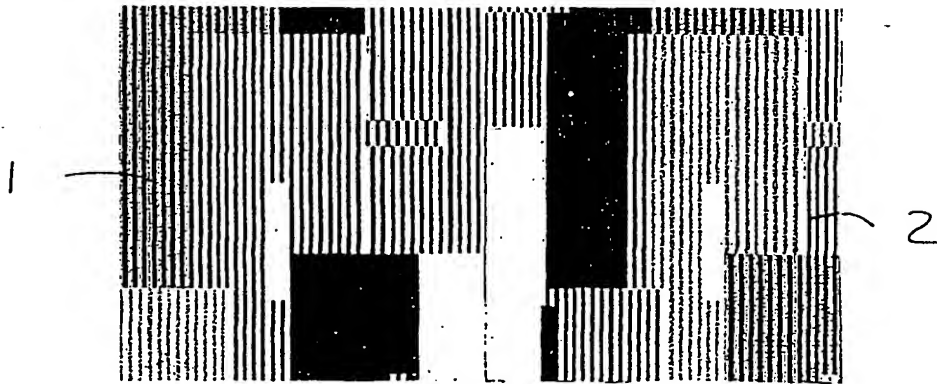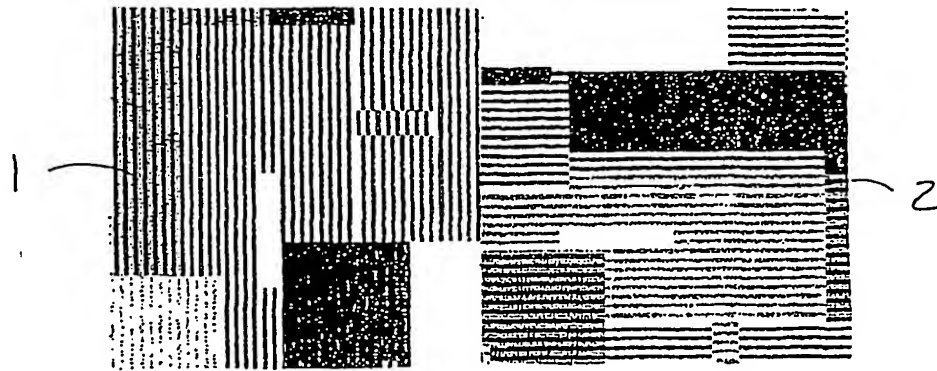5   the pattern; and

6   c.   designing and positioning the shapes in the pattern so that at least one shape

7   has at least one straight side parallel to a module edge and adjacent shapes have at least one

8   common color.

22

FIG. 1

FIG. 2

FIG. 3

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(71) Applicant: INTERFACE, INC. [US/US]; Suite 2000, 2859 Paces Ferry Road, Atlanta, GA 30339 (US).
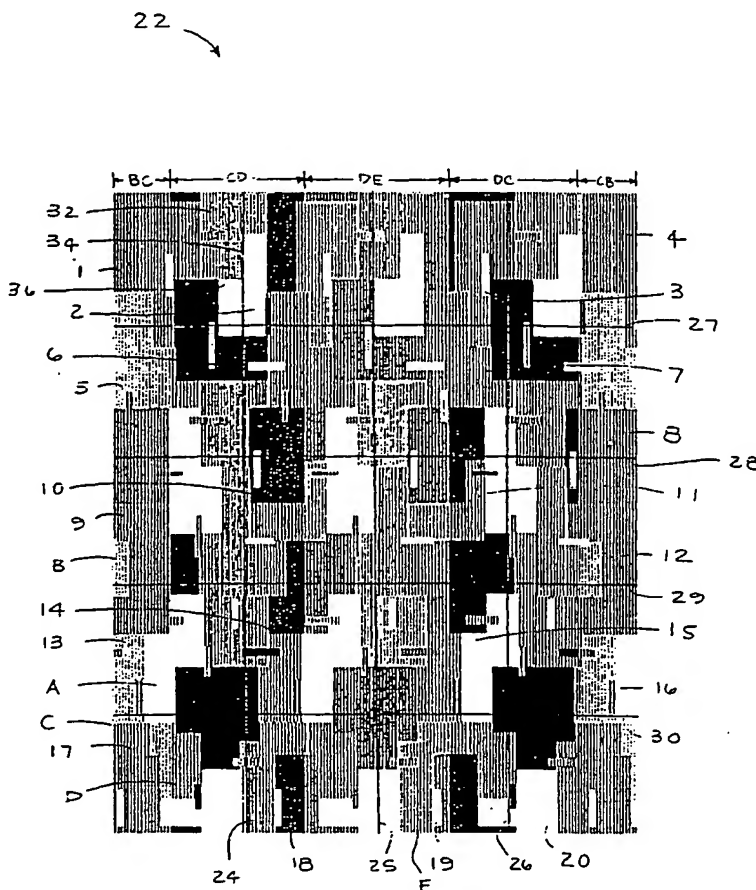
(72) Inventors: DANIEL, Sydney, D.; 702 Piney Woods Drive, LaGrange, GA 30240 (US). OAKEY, David, D.; 868 Piney Woods Drive, LaGrange, GA 30240 (US).

(74) Agents: PRATT, John, S. et al.; Kilpatrick Stockton LLP. Suite 2800, 1100 Peachtree Street, Atlanta, GA 30309-4530 (US).

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B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7   D06N   B44F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

WPI Data, EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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☐ Further documents are listed in the continuation of box C.   ☒ Patent family members are listed in annex.

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European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Pamies Olle, S

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